Retraction policies of high-impact biomedical journals

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Purpose: The purpose is to review the issue of retraction in the scientific literature and to examine the policies on retraction of major biomedical journals.

Method: The historical background of this issue was investigated through a literature search. The Instructions to Authors of 122 major biomedical journals were reviewed for evidence of a policy on the retraction of articles. Editors of those journals with no mention of retraction in their Instructions to Authors were contacted by email and/or postal mail.

Results: Sixty-two percent of the journals investigated did not post or report having a policy on issuing retractions. Only twenty-one (18%) did. The remainder did not post any policy and did not respond to inquiries.

Discussion: Including policies in Instructions to Authors relating to the principled conduct of research and publication will improve the ethical environment in which the scientific community works.

INTRODUCTION

Jennifer Aniston and Brad Pitt demanded one [1]. The whole country watched as the national television networks made lots of them on election night 2000 [2]. White House Press Secretary Ari Fliesher made one [3]. We hear about the *National Inquirer* being asked to do it all the time. The periodic table of chemical elements was even subject to it—twice, recently [4]. Internet Wire, an online news-release service, did it [5]. Even advertisements can be subject to them [6]. What do these seemingly unrelated incidents have in common? Retractions—in each case the individuals involved either asked for a retraction, have been asked for a retraction, or have retracted something they said.

Common mistakes, slip-ups, oversights, lapses, typographical errors, and the like occur on a regular basis in every area of communications. Thus, the issue of retraction comes up regularly in publishing. Even the venerable *New York Times* prints a ''Corrections'' column every day. In April 2003, the chief news executive at CNN essentially retracted twelve years of his network's news broadcasts from Iraq [7]. This startling announcement raised questions about how public opinion and US foreign policy might have been different had the reporting been accurate or had viewers known that reporters were censoring themselves to maintain their positions in that country. In the scientific literature, retractions also occur for many reasons, including faulty equipment, inaccurate calculations, contaminated samples, plagiarism, and fabrication or falsification of data [8].

It is generally believed that retractions help maintain the purity of science, help with the integrity of individual scientific journals and the whole of the scientific literature, and, when properly enforced, help keep scientists from bending the rules regarding scientific misconduct and publication. Retractions draw attention to unreliable information that is part of the scientific record. They assist researchers in using only correct information. A notice of retraction issued by the original authors and published in the same journal provides a simple, straightforward way to correct ordinary errors and mistakes and deliberate deceptions. Retraction notices tell potential readers that the article, its conclusions, and/or data should not be regarded as part of the legitimate body of knowledge of the field. Retraction of articles determined to be deceptive for any reason should be the norm, understood by all [9].

Fewer than 1% of the 316,000 articles indexed in MEDLINE in 1986 were retracted or contained error notices [10]. By mid-May 2003, PubMed listed 496 ''retracted publication(s)'' (articles retracted by their authors according to the National Library of Medicine), along with 526 ''retraction(s) of publication(s)'' (the author's statement of retraction). ISI databases record 5,000 correction and retraction notices each year [11].

The *Annals of Internal Medicine* published 144 corrections between 1980 and 1985, from more than 6,000 pages of articles [12]. One-third of these notices dealt with factual errors; 28% described omitted information that did not alter the overall results. The other retractions were typographical errors or corrections of authors' names or titles.

Budd et al. asked who retracts publications, what they retract, and why they make retractions [13]. In 1996, they found a total of 235 retracted articles in MEDLINE associated with 198 items of the publication type ''retraction of publication.'' One or more of the authors retracted 190 of the 235 articles; 45 were retracted by others. Two hundred articles were retracted in their entirety; for 35, only part of the article was retracted. In 91 articles, the retraction was based on error. Eighty-six papers were retracted because of misconduct or presumed misconduct. Another 38 articles were retracted because the authors could not replicate their results. The reasons for the other 20 retractions were unclassifiable.

THE ROLE OF JOURNALS IN RETRACTION ISSUES

Publication in scholarly journals is an essential part of the biomedical research process. Journals build their reputations by publishing articles of scientific import and significance, and, in turn, the reputation of the journal lends authenticity and legitimacy to the articles it publishes. So what happens when a journal's authenticity and legitimacy are challenged by the appearance of incorrect or fraudulent information in its pages?

''Speedy and full-throated'' should be the standard for retractions in the scientific publishing community [14]. There are many reasons for this. Kennedy, editor-in-chief of *Science*, lamenting a retraction from his prestigious journal wrote

> Scientists unknown to us relied on meaningless results, perhaps altering their own research plans as a consequence, and busy peer reviewers wasted valuable time. There is an even heavier cost: Each such case represents another depreciation of trust, not only within our community but also on the part of our public patrons. [15]

Caelleigh, then editor of *Academic Medicine,* wrote that editors have important roles in sustaining integrity in research and in maintaining the integrity of the scientific literature [16]. To this end, they must publish, where the information will be publicly and easily available, the policies and standards to which they will hold authors and reviewers; they must then enforce those policies; and they must follow through by publishing corrections, retractions, and notices of duplicate publication. According to Caelleigh, these guidelines should be public and easily available, because publication of the rules is essential to their enforcement. Therefore, they should be on the journal's Website, usually in the journal's Instructions for Authors. Journal policies for handing questionable publications must be clear, and the procedures for acting on them must be in place. Editors must even be prepared to retract articles on their own, without the concurrence of the authors or their institutions.

Garfield, the father of citation indexing and the founder of ISI, said that the correction of errors and the retraction of incorrect or premature conclusions is an expected part of the routine practice of science and that journal editors should routinely allocate space for the publication of such notices. Garfield quotes *New York Times* science writer Wade as saying, ''If journals reserved regular space for corrections, like those found in newspapers, statements of error might become less traumatic'' [17]. Garfield called on the scientific community to value its freedom enough to do what is necessary to retain its independence by policing itself and paying attention to small issues such as inadvertent errors and their corrections, so that those outside the community will not misinterpret inactivity. He said scientists must put their own house in order, because those outside the community do not understand the structure of science or the behavior of scientists.

Korn, speaking at the First International Symposium on Peer Review in Biomedical Publication in 1989, said that there is little agreement in the scientific community about the appropriate mechanisms of correction or retraction that would be clearly understandable and adoptable for general application [18]. He urged the scientific community to develop agreed-upon mechanisms to purge the literature of contaminated, and hence potentially dangerous, misleading information. In his opinion, the editors and publishers of the scientific literature must undertake this initiative, and, if they delayed doing so, it would become more likely that the necessary corrective mechanisms will be forced upon them by those outside the community and will be imposed by law or regulation.

This did indeed almost happen, shortly thereafter. In the early 1990s, Congress initiated an effort to get journals to retract articles shown to be associated with scientific misconduct. Bills reauthorizing funding for programs at the National Institutes of Health were introduced into Congress that also contained provisions that would essentially force scientific journals to adopt federal misconduct guidelines. Journals were threatened with elimination from indexing in MEDLINE, if they failed to cooperate. An editorial in *Nature* called the proposed sanction ''a powerful influence towards compliance'' but stated that journal editors were suspicious of this attempt by the Congress to tell them what to do, saying they already have their own policies and procedures in place to deal with scientific misconduct [19].

In its 1989 study, *The Responsible Conduct of Research in the Health Sciences,* the Institute of Medicine (IOM) said that journals need to more clearly define the responsibilities for publishing retractions of faulty research and that they have an obligation to publish retractions of published reports that have been found erroneous by the original authors or that have been declared fraudulent by appropriate authorities at the

research institutions [20]. They recommended that science journal editors develop a uniform system for reporting serious violations of professional standards to research institutions, as well as a standard format and location for the publication of notices of fraud, errors, and corrections.

In its expansion of topics included in the ''Uniform Requirements for Manuscripts Submitted to Biomedical Journals,'' the International Committee of Medical Journal Editors (ICMJE) published its statement on retraction of research findings in 1988 in four prominent medical journals [21]. This was updated in 1998 and again in 2000 and now appears as the section on ''Corrections and Retractions'' [22]. The ICMJE position is that it is not the function of a journal editor to investigate allegations about research they have published but to print retractions if and when published papers are found to be fraudulent by the funding agency or sponsoring institution. Retractions of fraudulent papers and ''expressions of concern'' about the possibility of fraud should be labeled as such and printed on a numbered page in a prominent section of the journal, and listed in the table of contents and should include in its heading the title of the original article. The text of the retraction should explain why the article is being retracted and include the proper bibliographic reference to it.

In the United Kingdom, the Committee on Publication Ethics (COPE) has issued guidelines on good publication practice [23]. These guidelines end with suggested sanctions for dealing with misconduct. Short of reporting to the General Medical Council, the most severe sanction is ''Formal withdrawal or retraction of the paper from the scientific literature, informing other editors and the indexing authorities.''

The ninth edition of the American Medical Association's *Manual of Style* considers the issue of retraction in a section on ''Editorial Policy for Detecting and Handling Allegations of Scientific Misconduct,'' saying that editors of AMA journals ''will respond strongly to evidence of misappropriation or misrepresentation, promptly publish a retraction, preferably but not necessarily signed by the offending authors in the correspondence column'' [24]. The policy suggests that editors work with authors to make the retraction notices as accurate as possible, giving the authors an opportunity to soften their misconduct.

The Office of Research Integrity (ORI), US Department of Health and Human Services, provides guidelines designed to provide direction to editors on reporting suspect manuscripts, facilitating investigations of allegations of misconduct, improving correction of the literature, and promoting research integrity [25]. The Public Health Service (PHS) requires that articles based on PHS-funded research involved in any misconduct finding be corrected or retracted. Those subject to such a misconduct finding must submit a letter within thirty days to the pertinent journal requesting publication of a correction or retraction. To ensure that editors are notified, ORI sends them a letter with a copy of the official report of the misconduct. ORI may request that journals publish corrections or retractions resulting from scientific misconduct cases, but they do not have the authority to require the journal to do it. They can, however, require the scientist who committed the misconduct to submit the request. ORI also asks that the retraction be labeled as such, appear in a prominent section of the journal, be listed in the table of contents, and include in its heading the title and citation of the original journal article, just as the National Library of Medicine (NLM) requires.

THE ROLE OF ABSTRACTING AND INDEXING SERVICES

NLM became aware in the early 1980s that as the compiler of the world's largest biomedical database, it could be the unwitting conduit for disseminating incorrect information [26]. Therefore, in 1984, NLM implemented a policy for identifying and indexing published retractions. Their online database provided the opportunity to link the retracting article to the original article. They chose to do this rather than delete the citation to the retracted article, because they felt that removal might affect historical perspective. The system requiring a published statement of retraction, withdrawal, or erratum signed by either the author or the editor was established because as Lindberg, director of NLM, the publisher of MEDLINE, feared ''a more aggressive approach by the Library would risk placing us in the inappropriate role of censor'' [27]. Addressing the related issue of the effect of retraction on electronic records, Plutchak, editor of the *Journal of the Medical Library Association* said, ''We must never forget that the preservation of the historical record, with all of its faults, mistakes, and corrections, is an essential part of the service that librarianship performs for society. As the medium of information becomes more elusive, we must become more vigilant'' [28].

NLM's position on these issues is stated in the fact sheet, ''Errata, Retraction, Duplicate Publication, and Comment Policy for MEDLINE'' [29]. NLM defines retraction as a letter to the editor or an editor's statement that a previously published article was based on research that was either deliberately falsified or used unsubstantiated data. Retracted citations in MEDLINE include a statement identifying the retracting paper. The retracting article is also indexed with the title field amended with the reference to the original articles it retracts. The retracting article is indexed with the Medical Subject Headings (MeSH) ''Retraction of Publication'' heading, thus linking the retracted article and the retracting articles. Through the ''Retraction of Publication'' heading, all references to retracted articles in the database can be located. The MeSH ''Retracted Publication'' heading was added in 1989 to all citations to retracted articles.

The ''Comments'' heading alerts MEDLINE users to the existence of comments about a previous article. ''Comments'' may criticize any section of an article, question its results or conclusions, may provide addi-

tional data, or use the original article as a starting point for discussion of the writer's own ideas.

''Errata''—significant errors in the text, abstract, or descriptive portions of an article—began to be cited in 1987. As many as 200 substantive errors are found each month. Even when there is no question of deliberate misrepresentation, NLM is responsible for notifying its users of errors in articles and making corrections where possible. Notices must be clearly labeled and printed on a numbered page of the journal. Exceptions are permitted for cases where the error could have serious consequences. Published errata notices are rare; in 1987, NLM added correction notices to only 0.8% of the MEDLINE records.

Chemical Abstracts (CA), the indexing service owned by the American Chemical Society (ACS), republishes corrected abstracts and eliminates the questionable abstract from future volumes. The original entry no longer exists. ACS covers retractions and links them to the original reference in CA by citing CA accession information and indexing. The title of the original paper is followed by the statement in brackets ''Retraction to document cited in CAXXX:YYYYYY,'' where XXX is the CA volume number and YYYYYY is the abstract number (the check-letter may be omitted). This provides the link to the original CA abstract and index record [30].

At BIOSIS, the policy is that when a retraction appears in a journal that they monitor, the database is checked to see if the article in question was cited [31]. If it was, then the retraction is cited as well. When they cite a retraction, the text of the retraction statement is taken as the abstract. The indexing from the original citation is copied to the citation for the retraction. This is done so that the chances of an end user retrieving the retraction citation along with the original citation are high.*

HOW JOURNALS HANDLE RETRACTIONS

In 1990, Friedman detailed the responses of 30 biomedical journals to official notification of the results of a fraud investigation of 135 articles these journals had published [32]. Statements concerning 46 of 60 nonvalid articles were eventually published, but only 7 notices covering 15 articles were found in MEDLINE using the MeSH heading ''Retraction of Publication.'' A separate poll of 15 of these editors showed that 14 of their journals had no written policies in 1986 for responding to allegations of research misconduct. One established a policy shortly thereafter. According to Friedman, the conservative indexing policies of NLM put the responsibility on the journal editor to prepare an unambiguous and clearly labeled statement of retraction. This responsibility creates the need for a similarly unambiguous and clearly labeled statement of policy on retraction on the part of the journal and its editors.

Snodgrass and Pfeifer analyzed ninety retraction notices from 1975 to 1991 and found that very few followed the ICMJE recommendations. Few were prominent in style, format, or placement [33]. The authors suggested that, because medical journal editors now had the ICMJE format guidelines to follow, they should follow them and include them in their Instructions to Authors.

Nature surveyed 29 journals about their response to the finding by DFG, the main German research funding agency, that 94 German cancer research papers were likely to contain manipulated data [34]. The 20 responding journals had published 60 of the articles. Twenty-two of the articles had been retracted by 5 of the journals; 14 journals had retracted none; another retracted 1 of 3 it had published. Eleven journals claimed to be unaware of either the investigation or its completion. The journals involved had not been notified of the results of the inquiry, which were posted on the DFG Website. An earlier report on this same case, described in *BMJ* in 1998, pointed out 47 articles published in 19 journals, with only 2 journals having retracted articles a year after the finding [35].

The *Nature* survey also noted that the journals involved did not have a common policy for retracting papers. ''Scientific leaders and misconduct investigators around the world have long complained that, even when scientific misconduct is proven, no reliable mechanisms exist to remove bad information from the literature'' [36]. In his article, Neuweiler, a zoologist at the University of Munich and former president of Germany's science council, decried the lack of responsible agents for informing journals of bad data and the absence of ways of alerting the scientific community.

Most journals included in the *Nature* survey required authors to request retraction. Few of the editors of these journals were willing to act, because one of the authors had been advised by his lawyer not to retract any of his papers. This is in sharp contrast with the retraction by the *New England Journal of Medicine* in July 2002 of an article the authors refused to retract after evidence was uncovered that the authors had falsified data [37].

THE ROLE OF MEDICAL LIBRARIES

Several articles have appeared in the library literature concerning the fate of retracted articles. Pfeifer and Snodgrass tracked the fate of retracted, invalid articles [38]. They found that, after retraction, 82 completely retracted articles were cited a total of 733 times. These authors identified several possible reasons why invalid information continued to be used: lack of information on retracted works; inconsistency in retraction format, terminology, and indexing; and an apparent lack of sufficient attention to manuscripts by some authors and editors. These authors suggested that in addition to improving the consistency of retraction notices, journals should consider listing retractions in their

* Embase did not respond to requests by email or through its sales representatives to answer the question of how they handle retractions.

own cumulative indexes and ''offer more explicit expectations of their authors regarding the accuracy and integrity of their references.''

Duggar et al. believe that promoting awareness of retracted literature is an important function of librarians [39]. They cite the 1989 mission statement of the Medical Library Association, which included dedication ''to improving the professional excellence and leadership of the health information profession to foster the art and science of health services,'' as the basis for their belief that medical librarians face a professional challenge to become involved in the scientific process by educating and informing the medical and scientific community about retractions. They surveyed opinions and responsibilities for disseminating information about retractions in the consortium of South Central Academic Medical Libraries.

Hughes surveyed academic medical libraries to find out how many had policies and procedures for identifying retracted publications. Fifty-nine percent had no policy and no practice for calling the attention of potential readers to retracted publications; 41% called attention to them with or without a formal policy for doing so [40]. The most common reason for not dealing with retracted publications was lack of staff. Hughes created a Website in an effort to facilitate the identification of retracted publications, but, by September 2003, it no longer existed.

THE CURRENT STUDY

Kennedy, editor of *Science*, questioned the role of the journal when mistakes, due to fraud or common error, occur.

> What role should *Science* play? Plainly, journals, as the places for which research results are headed, have some responsibility. Although they cannot create deception-proof peer review, they can treat retractions honestly and forthrightly. They can express the community's interest in the trustworthiness of results and close their pages to transgressors. They should also praise responsible actions, especially when those carry personal costs. [41]

Do the scientific community's most important journals follow Kennedy's advice? Do they ''treat retractions honestly and forthrightly?'' Publication and widespread availability is essential to the enforcement of any rules. Are journal policies dealing with questionable publications and the procedures for acting on them clear? In this paper, ''honesty and forthrightness'' will be demonstrated by the appearance in the journals' Instructions to Authors of a statement regarding policies and procedures regarding retraction of published articles.

METHODS

One hundred twenty-two journals were selected from the 1999 *Journal Citation Report (JCR)* Science Edition based on impact factor (Table 1). ISI, publisher of *JCR,* designed the impact factor as a measure of the frequency with which the ''average article'' in a journal has been cited in a particular year. The impact factor was created to help evaluate a journal's relative importance, especially when compared to others in the same field.

Instructions to Authors tell potential authors what is expected of them when they submit an article, both in terms of manuscript preparation (e.g., length, bibliographic format, and data presentation) and standards of research practice (e.g., conflict of interest statements and patient confidentiality). These same instructions should also inform them as to what happens if these criteria are found not to have been fulfilled after the article is published, in other words, what the journal's policies and procedures are for handling corrections and retractions of their publications.

Therefore, Instructions for Authors for each of these journals were examined online during the spring of 2002. If there was no mention of retractions online, an email inquiry was sent to the journal editor asking whether or not the journal had such a policy. Letters with prepaid return envelopes were sent to those editors who did not respond to email.† The letter and the email message very simply asked, ''Does your journal have a policy concerning retractions? If so, where can I find a copy?'' The response rate was very high, just under 80%.

RESULTS

Only 4 journals of the 122 journals investigated—*Infection and Immunity, Journal of Neurosciences, Journal of Virology,* and *Molecular and Cellular Biology*—had statements of policy about retraction on their Websites. Twenty-nine journals stated in their online Instructions to Authors that they followed the ''Uniform Requirements for Journals Submitted to Biomedical Journals,'' but it is not clear if that included the issues beyond manuscript preparation, including retraction, covered in separate statements. Of these 29, only 6 editors—*Annals of Internal Medicine, Clinical Pharmacology and Therapeutics, Journal of Clinical Psychiatry, Neurology, New England Journal of Medicine,* and *Pharmacogenetics*—referred to the ''Uniform Requirements'' in response to the specific question about retractions. None of the others mentioned it in their responses.

An additional eleven editors reported that they had a retraction policy for their journals. Thus, a total of twenty-one journals (17% of the initial 122 and 21% of those responding) were found to have or to report having such a policy (Table 2). Several that reported having no policy said at the same time that they followed the standards set by ICMJE (such as *Clinical Pharmacology and Therapeutics* and *Journal of Clinical Psychiatry*) or COPE (*AIDS*).

Seventy-six journals (78% of the responding editors) reported having no policy on issuing retractions; none

† No attempt was made to contact eight European journal editors because of problems with the use of prepaid return envelopes from another country.

Table 1
122 highest impact biomedical journals*†

AIDS	*European Journal of Immunology*	*Journal of Molecular Biology*
American Journal of Human Genetics	*FASEB Journal*	*Journal of Molecular Graphics and Modelling*
American Journal of Medicine	*Gastroenterology*	*Journal of the National Cancer Institute*
American Journal of Pathology	*Genes Chromosomes and Cancer*	*Journal of Neurochemistry*
American Journal of Psychiatry	*Genes and Development*	*Journal of Neuropathology and Experimental Neurology*
American Journal of Respiratory Cell and Molecular Biology	*Gene Therapy*	*Journal of Neuroscience*
	Genes to Cells	*Journal of Physiology*
American Journal of Respiratory and Critical Care Medicine	*Genetics*	*Journal of Virology*
	Genome Research	*JAMA*
Anesthesiology	*Glia*	*Laboratory Investigation*
Annals of Internal Medicine	*Gut*	*Lancet*
Archives of General Psychiatry	*Hepatology*	*Mechanisms of Development*
Archives of Internal Medicine	*Hippocampus*	*Medicine*
Arteriosclerosis Thrombosis and Vascular Biology	*Human Brain Mapping*	*Molecular Biology of the Cell*
	Human Gene Therapy	*Molecular Biology and Evolution*
Arthritis and Rheumatism	*Human Molecular Genetics*	*Molecular Cell*
Behavioral and Brain Sciences	*Hypertension*	*Molecular and Cellular Biology*
Biochemical Journal	*Immunity*	*Molecular Endocrinology*
Biochemistry	*Infection and Immunity*	*Molecular Microbiology*
Blood	*Investigative Ophthalmology and Visual Science*	*Molecular Pharmacology*
Brain	*Journal of Allergy and Clinical Immunology*	*Molecular Psychiatry*
Brain Pathology	*Journal of the American College of Cardiology*	*Nature Genetics*
BMJ	*Journal of the American Society of Nephrology*	*Nature Medicine*
CA-Cancer Journal for Clinicians	*Journal of Biological Chemistry*	*Nature Structural Biology*
Cancer Gene Therapy	*Nature Neuroscience*	*Neurobiology of Disease*
Cancer Research	*Journal of Biological Inorganic Chemistry*	*NeuroImage*
Carcinogenesis	*Journal of Bone and Mineral Research*	*Neurology*
Cell	*Journal of Cell Biology*	*Neuron*
Cell Growth and Differentiation	*Journal of Cell Science*	*Neuropharmacology*
Cerebral Cortex	*Journal of Cerebral Blood Flow and Metabolism*	*Neuropsychopharmacology*
Chemistry and Biology	*Journal of Clinical Endocrinology and Metabolism*	*New England Journal of Medicine*
Circulation Research	*Journal of Clinical Investigation*	*Nucleic Acids Research*
Circulation	*Journal of Clinical Oncology*	*Oncogene*
Clinical Pharmacology and Therapeutics	*Journal of Clinical Psychiatry*	*Pharmacogenetics*
Developmental Biology	*Journal of Clinical Psychopharmacology*	*Protein Science*
Development	*Journal of Cognitive Neuroscience*	*Radiology*
Diabetes	*Journal of Experimental Medicine*	*RNA*
Diabetes Care	*Journal of General Physiology*	*Schizophrenia Bulletin*
Diabetalogica	*Journal of Immunology*	*Stroke*
EMBO Journal	*Journal of Infectious Diseases*	(*Structure with*) *Folding and Design*
Emerging Infectious Diseases	*Journal of Investigative Dermatology*	*Thrombosis and Haemostasis*
Endocrinology	*Journal of Leukocyte Biology*	

* This is the same list of journals (with two exceptions) that appears at Table 1 in the article ''Emerging Ethical Issues in Instructions to Authors of High-impact Biomedical Journals.'' J Med Libr Assoc 2003 Oct; 91(4):442–9.
† Journals with the highest impact factors were selected from the 1999 *Journal Citation Report* Science Edition were selected from the following medical categories: Allergy; Anatomy & Morphology; Anesthesiology; Behavioral Sciences; Biochemical Research Methods; Biochemistry & Molecular Biology; Biotechnology & Applied Microbiology; Cardiac & Cardiovascular Systems; Cell Biology; Chemistry, Medicinal; Clinical Neurology; Dermatology & Venereal Diseases; Developmental Biology; Emergency Medicine & Critical Care; Endocrinology & Metabolism; Gastroenterology & Hepatology; Genetics & Heredity; Geriatrics & Gerontology; Hematology; Immunology; Infectious Diseases; Medicine, General & Internal; Medicine, Research & Experimental; Microbiology; Neurosciences; Nuclear Science & Technology; Nutrition & Dietetics; Obstetrics & Gynecology; Oncology; Ophthalmology; Orthopedics; Otorhinolaryngology; Pathology; Pediatrics; Peripheral Vascular Disease; Pharmacology & Pharmacy; Physiology; Psychiatry; Radiology; Nuclear Medicine & Medical Imaging; Rehabilitation; Transplantation; Tropical Medicine; Urology & Nephrology; and Virology.

of these had any relevant information on their Websites. Of those with no policy, eighteen stated that any such incidences would be handled on a case-by-case basis. A number of journal editors reported never having had a retraction and thus no cause to develop a policy to handle them. Another said they do not publish retractions.

Some journals do have clearly enunciated policies on this issue. For example, the editor of the *Journal of the American Association of Gynecologic Laparoscopists,* concluded an editorial entitled ''AAGL Inappropriate Acts Policy,'' with a statement on retraction of publication.

If data are found to be fabricated or if plagiarism occurred and is published, a notice of retraction shall be published in the Journal. The author(s) will have 30 days to submit a retraction; otherwise the Editorial Board will write the notice of retraction, which will include the name(s) of the author(s), title of the article, and reason for the retraction. [42]

The retraction policy of the American Society for Microbiology (ASM), publisher of two of the four journals in this study having a retraction policy on their Website, is clearly stated in the Instructions to Authors for each of its eleven journal publications. The following is taken from *Applied and Environmental Microbiology.*

Retractions are reserved for major errors or breaches of ethics that, for example, may call into question the source of the data or the validity of the results and conclusions of an article. Send a Retraction and an accompanying explanatory letter *signed by all of the authors* directly to the editor in chief of the journal. The editor who handled the paper and the

Table 2
High-impact journals with retraction policies

Journal	Policy statement
Annals of Internal Medicine	ICJME Uniform Requirements
Archives of General Psychiatry	AMA Style Manual, pages 105–7
Archives of Internal Medicine	AMA Style Manual, pages 105–7
Biochemical Journal	Email from assistant director of publishing*
Circulation Research	Email from managing editor†
Human Gene Therapy	Email from editor-in-chief‡
Human Molecular Genetics	Letter from executive editor§
Infection and Immunity	http://iai.asm.org/misc/itoa.pdf pg x
Journal of the American Society of Nephrology	Letter from editor in chief**
Journal of Molecular Graphics and Modelling	Email from director, Global Rights, Elsevier Science††
Journal of Neuroscience	http://www.sfn.org/content/AboutSfN1/Guidlines/ethics.html Society for Neuroscience Policy on Ethics
Journal of Virology	http://jvi.asm.org/misc/itoa.pdf, page x
JAMA	AMA Style Manual, pages 105–7
Molecular and Cellular Biology	http://mcb.asm.org/misc/ifora.shtml, page ix
Nature Genetics	Nature Publishing Group internal company document
Nature Medicine	Nature Publishing Group internal company document
Nature Neuroscience	Nature Publishing Group internal company document
Nature Structural Biology	Nature Publishing Group internal company document
Neurology	ICJME Uniform Requirements
New England Journal of Medicine	ICJME Uniform Requirements
Radiology	AMA Style Manual

* Policy is not available in print. Policy was outlined in email to author.
† Email referred to section 17(f) of online instructions to authors, http://circres.ahajournals.org/misc/ifora.shtml, which refers to charges for printing a correction (erratum) after publication resulting from an author's error. Errata are generally published only online. Instructions also mention ICJME Uniform Requirements.
‡ ''We do have a retraction policy, but it is not in writing. It happens so seldom (two times in 12 years) that I do it on a case by case basis.''
§ ''It is informal, based on judgment of editors.''
** ''JASN publishes errata when these are identified. However, the issue of retracting an article has not come up during my tenure as Editor-in-Chief.''
†† ''Yes, we do have a retraction policy, but it is general to all our journals and not specific to anyone.''

chairman of the ASM Publications Board will be consulted. If all parties agree to the publication and content of the Retraction, it will be sent to the Journals Department for publication. [43]

DISCUSSION

Scheetz also found that the Instructions to Authors of only a few journals addressed the topic of correcting the literature. She found this surprising because of the importance journals place on upholding their intellectual integrity, promoting their reputations for accuracy, and maintaining a competitive edge in their field of publication [44].

Mishkin, an attorney who specializes in publication issues, says that scientists must know what is expected of them and that institutions must be able to impose sanctions for violations [45]. People cannot be punished for conduct they did not know was wrong. Scientists must know how and why their work might be retracted. Such information about research and its standards are no longer universally understood and are not always passed from teacher to student in the course of education. Scientific journals that unwittingly publish articles that are later discredited have an obligation to correct the record. If the source of the information were an academic institution or a federal agency, the journal would not be liable for defamation for reporting that information if it prints either the formal notice as received or a summary.

Writing with another attorney, Mishkin also confirmed the frequently expressed belief that journal editors fear being sued for defamation so much that they are unwilling to publish letters from coauthors or university officials [46]. In Mishkin and Schwartz's expert view, the editors' fear of liability is greatly exaggerated. The ''fair reporting'' privilege protects publication of facts that are of legitimate interest to expected readers. Scientific research clearly belongs in this category. Also, the peer-review process constitutes due diligence, which provides additional protection. Therefore, unless a journal knowingly publishes the work of someone known to be unreliable or bypassed the standard peer-review process, it is unlikely that a court would ever hold an editor liable for printing a critique of a previously published article.

To carry out their responsibility to their readers, editors are ethically responsible for ensuring the accuracy and validity of the material they publish. According to Cowell, long-time editor of the *Journal of Bone and Joint Surgery,* editors must both make the rules for their journals and enforce them and make the rules known by printing them in the Instructions to Authors [47].

ORI has also suggested that editors include in their Instructions to Authors a policy for handling suspect manuscripts and that, by submitting their manuscripts, authors accept this policy [48]. It is hoped that this will discourage authors from attempting misconduct, because they know that they will be subject to specific action if scientific misconduct concerns are detected. ORI also encouraged editors to incorporate the ICMJE standard for retractions into their policies. ORI believes that editors have the ability to promote research integrity by developing policies, procedures,

guidelines, or requirements on reporting of suspect manuscripts, handling of suspect manuscripts, coauthor responsibilities, submission of data, review of manuscripts, and submission and publication of corrections and retractions.

Simoni, editor of the *Journal of Biological Chemistry,* believes that cooperative biomedical ventures like GenBank, the European Molecular Biology Laboratory Nucleotide Sequence Database (EMBL), and the Protein Data Bank would never have achieved their current levels of importance if journals did not make deposition of information a prerequisite for publication [49]. This demonstrates ORI's belief in the power of journal editors to influence author and researcher behavior and to promote high standards of scientific research and publication. In much the same way, journals should exert their influence on authors to improve their adherence to the highest standards of research and publication by making the penalties for not doing so eminently clear by including them in their Instructions to Authors.

Caelleigh agrees, saying, ''Editors can strongly influence researchers by setting, announcing, and applying clear publication standards of conduct that the journal expects its author-researchers to observe'' [50]. Scheetz concluded her work by saying that ''Editors and publishers charged with critiquing and disseminating the research are in a unique position to help cultivate a scientific culture that promotes research integrity through the instructions they provide authors'' [51]. Editors can enhance the research cycle by educating their readers about research integrity. The retraction process is an integral part of the research cycle. Efforts to increase understanding of all aspects of the publication process, including retractions, will benefit researchers, authors, and editors and promote the journal's professional integrity.

The policies and procedures of biomedical journals on the issues of retraction remain in the same state as they were in 1991, when the deputy editor of *The Lancet* in an editorial in *Investigative Radiology* urged journals to get the retraction system right [52]. Few journals have publicly stated policies, most seem to believe it will not happen to them, and, if it does, they will handle it based only on the particulars of the specific incident and not on a well-thought out and well-publicized policy.

Tobin, editor of the *American Journal of Respiratory and Critical Care Medicin*e, writing in 2000 about the first retraction in the journal's 162-volume history, said,

> The process for correcting the literature shows science is a communal enterprise, based on sharing of information. All participants in the research enterprise must accept responsibility for maintaining the integrity of the scientific literature. Editors must contact involved parties when allegations are made, make sure they are informed of results of any investigations, and setting the publication record straight. [53]

As medical librarians, we should also consider our role in this ''communal enterprise'' in helping to maintain the integrity of the scientific literature.

The Young Adult Library Services Association (YALSA), a division of the American Library Association (ALA), has a Publisher's Liaison Committee whose function is to improve understanding between publishers and librarians in libraries' use of materials with teenagers, so that such materials are supplied more effectively. ALA's Association for Library Collections and Technical Services (ALCTS) also has a Publisher/Vendor Library Relations Interest Group. The Medical Library Association has a representative and a staff liaison to this group. While its charge emphasizes the commercial relationships between libraries and publishers and vendors and focuses on vendor relationships, this unit, and the YALSA committee, could serve as a starting point or a model for creating a voice for libraries and librarians in the publishing world.

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